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NOTICE OF ALLOWANCE AND FEE(S) DUE

7590 06/30/2008

REED SMITH LLP
Suite 1400
3110 Fairview Park Drive
Falls Church, VA 22042

EXAMINER

CAMPOS, YAIMA

ART UNIT

PAPER NUMBER

2185

DATE MAILED: 06/30/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/790,175

03/02/2004

Naoki Watanabe

HITC.0003

3548

TITLE OF INVENTION: METHOD AND APPARATUS OF REMOTE COPY FOR MULTIPLE STORAGE SUBSYSTEMS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	09/30/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
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P.O. Box 1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

7590

06/30/2008

REED SMITH LLP
Suite 1400
3110 Fairview Park Drive
Falls Church, VA 22042

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

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nonprovisional

NO

\$1440

\$300

\$0

\$1740

09/30/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
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CAMPOS, YAIMA

2185

711-141000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

1 _____

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☐ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 238 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 238 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.

10/790,175

Examiner

YAIMA CAMPOS

Applicant(s)

WATANABE, NAOKI

Art Unit

2185

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 4/4/08.
2. ☒ The allowed claim(s) is/are 1-22.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>4/4/08</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

1. As per the instant Application having Application number 10/790,175, the examiner acknowledges the applicant's submission of the amendment dated April 4, 2008. At this point, claims 1, 8 and 15 have been amended, and claim 22 has been added.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

3. Authorization for this examiner's amendment was given in a telephone interview with Jennifer Teng (Reg. No. L0099) on June 17, 2008 and June 18, 2008.

4. **Claims 8-10, 12-13 and 19** have been amended as follows:

5. **Claim 8 (Currently amended)**

A software residing in a computer readable storage medium ~~for that~~ remotely ~~copying~~ copies data from each of a plurality of primary volumes directly via a remote copy link to a corresponding secondary volume of a plurality of secondary volumes implemented in a data storage system that includes a plurality of primary storage subsystems, a plurality of secondary storage subsystems that are connected to each other via a network, and a host computer including a remote copy manager (RCM) and being connected with the secondary storage subsystems, wherein a number of the plurality of primary storage subsystems is different from a number of the plurality of secondary storage subsystems, the primary volumes are constituted by the

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primary storage subsystems, and wherein the secondary volumes are constituted by the secondary storage subsystems, the software comprising:

(1) a normal synchronizing module including:

a module ~~for~~ receiving via the remote copy link, at each of the secondary storage subsystems, remote copy requests which are each associated with a timestamp and directly sent from each one of the plurality of primary storage subsystems respectively;

a module ~~for~~ receiving via the remote copy link, at each of the secondary storage subsystems, synchronizing requests each of which is associated with a timestamp and a primary storage ID of a primary storage subsystem, which sends a respective synchronizing request, from said each one of the primary storage subsystems respectively;

a module ~~for~~ determining, at each of the secondary storage subsystems, a first timer as a first time parameter based on the timestamps included in the synchronizing requests; and

a module ~~for~~ determining, at each of the secondary storage subsystems, which remote copy requests to process based on the first time parameter, primary storage IDs and timestamps associated with the remote copy requests, thereby maintain data I/O consistency among said storage subsystems; and

(2) an after-failure synchronizing module including:

a module ~~for~~ suspending said remote copy requests from being directly sent from the primary storage subsystems via the remote copy link to the secondary storage subsystems after a failure occurs, thereby starting a suspension period;

a module ~~for~~ collecting via a network link and comparing during the suspension period by the RCM in the host computer time parameters stored in the secondary storage systems to

determine a synchronized time, said network link being different from the remote copy link and not overlapping with the remote copy link;

a module ~~for~~ receiving via said network link during the suspension period from the RCM in said host computer at each of the secondary storage subsystems synchronizing requests each of which includes said synchronized time;

a module ~~for~~ updating during the suspension period second time parameters at each of the secondary storage subsystems up to said synchronized time;

and a module ~~for~~ determining during the suspension period, at each of the secondary storage subsystems, which remote copy requests to process based on said updated second time parameter and processing a determined remote copy request by said each secondary storage subsystem therein, thereby maintaining data I/O consistency among said storage subsystems.

6. Claim 9 (Currently amended)

The software of claim 8, wherein the normal synchronizing module further includes:

a module ~~for~~ write processing, at each of the secondary storage subsystems, in accordance with remote copy requests that are associated with timestamps indicating a earlier time than the first time.

7. Claim 10 (Currently amended)

The software of claim 8, wherein the normal synchronizing module further includes:

a module ~~for~~ managing, at each of the secondary storage subsystems, a second time parameter for each of the primary storage subsystems, and ~~for~~ updating the corresponding second time parameters in response to timestamps associated with the synchronizing requests

that indicate a later time than corresponding second time parameters of the second storage subsystems.

8. Claim 12 (Currently amended)

The software of claim 8, wherein the module ~~for~~ determining in the after-failure synchronizing module includes a module ~~for~~ updating a secondary volume corresponding to the determined remote copy request.

9. Claim 13 (Currently amended)

The software of claim 8, wherein said module ~~for~~ determining in the after-failure synchronizing module includes a module ~~for~~ selecting remote copy requests which are received by the secondary storage subsystems prior to the suspension and have a first time parameter smaller than or equal to said synchronized time to be processed so as to update a corresponding secondary volume.

10. Claim 19 (Currently amended)

In a ~~software~~ system according to claim 15, wherein means for determining in the after-failure synchronizing means includes means for updating a secondary volume corresponding to the determined remote copy request.

ACKNOWLEDGEMENT OF REFERENCES CITED BY APPLICANT

11. As required by **M.P.E.P. 609(C)**, the applicant's submissions of the Information Disclosure Statement dated April 4, 2008 is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by

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M.P.E.P 609 C(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

REASONS FOR ALLOWANCE

12. Per the instant office action, claims **1-22** are considered as allowable subject matter.

13. The primary reasons for allowance of claim **1** in the instant applicant is the combination with the inclusion in these claims of the limitation of a synchronization method wherein consistency is maintained among primary and secondary storage volumes having **“...1) a normal synchronizing procedure... receiving via the remote copy link... remote copy requests... receiving via the remote copy link... synchronizing requests... 2) an after failure synchronizing procedure... suspending said remote copy requests from being directly sent from the primary storage subsystems via the remote copy link to the secondary storage subsystems... collecting via a network link and comparing during the suspension period by the RCM in the host computer time parameters in the secondary storage subsystems to determine a synchronized time, said network link being different from the remote copy link and not overlapping with the remote copy link; receiving via said network link during the suspension period from the RCM... synchronizing requests... thereby maintaining data I/O consistency among said storage subsystems”**. The prior art of record neither anticipates nor renders obvious the above-recited combination.

14. The primary reasons for allowance of claim **8** (*as amended above*) in the instant applicant is the combination with the inclusion in these claims of the limitation of a software system residing in a computer readable storage medium wherein consistency is maintained among

primary and secondary storage volumes having “...1) a normal synchronizing module including... a module receiving via the remote copy link... remote copy requests... a module receiving via the remote copy link... synchronizing requests... 2) an after failure synchronizing module... a module suspending said remote copy requests from being directly sent from the primary storage subsystems via the remote copy link to the secondary storage subsystems... a module collecting via a network link and comparing during the suspension period by the RCM in the host computer time parameters in the secondary storage subsystems to determine a synchronized time, said network link being different from the remote copy link and not overlapping with the remote copy link; a module receiving via said network link during the suspension period from the RCM... synchronizing requests... thereby maintaining data I/O consistency among said storage subsystems”. The prior art of record neither anticipates nor renders obvious the above-recited combination.

15. The primary reasons for allowance of claim **15** in the instant applicant is the combination with the inclusion in these claims of the limitation of a synchronization system wherein consistency is maintained among primary and secondary storage volumes having “...1) a normal synchronizing means including... means for receiving via the remote copy link... remote copy requests... means for receiving via the remote copy link... synchronizing requests... 2) an after failure synchronizing means including... means for suspending said remote copy requests from being directly sent from the primary storage subsystems via the remote copy link to the secondary storage subsystems... means for collecting via a network link and comparing during the suspension period by the RCM in the host computer time

parameters in the secondary storage subsystems to determine a synchronized time, said network link being different from the remote copy link and not overlapping with the remote copy link; means for receiving via said network link during the suspension period from the RCM... synchronizing requests... thereby maintaining data I/O consistency among said storage subsystems". The prior art of record neither anticipates nor renders obvious the above-recited combination.

16. Dependent **claims 2-7, 9-14, and 16-22** are allowable at least for the reasons recited above including all the limitations of the allowable independent base claims upon which they depend.

17. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

DIRECTION OF FUTURE CORRESPONDENCES

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yaima Campos whose telephone number is (571)272-1232. The examiner can normally be reached on Monday to Friday 8:30 AM to 5:00 PM.

IMPORTANT NOTE

19. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on (571)272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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20. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 17, 2008

//Yaima Campos/
Examiner, Art Unit 2185

/Sanjiv Shah/

Supervisory Patent Examiner, Art Unit 2185